

# THE , BOSTON MEDICAL AND SURGICAL JOURNAL.

VOL. XCVII.—THURSDAY, JULY 26, 1877.—NO. 4.

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## INTRA-UTERINE INJECTIONS IN POST-PARTUM HÆMOR- RHAGE.<sup>1</sup>

BY SAMUEL W. TORREY, M. D., BEVERLY.

POST-PARTUM hæmorrhage, with its sudden emergencies and its instant demand for energetic treatment, is a subject of great importance to every general practitioner, and particularly so in connection with the question of treatment by means of intra-uterine injections, a practice which is becoming quite common, but the merits of which are still *sub judice*. Of the efficacy of intra-uterine irritant astringent injections there is no doubt; it is the danger attaching to the practice which I shall allude to especially. It is a generally conceded fact that injections into the uterus, in any condition of that organ, are dangerous. Penetration of the fluid through the Fallopian tubes, even when every precaution has been taken by experienced operators to insure the return of the injection through the dilated cervix, has been the cause of so many evil results that Dr. Barnes says, "I rarely employ them now except in urgent danger from menorrhagia." Dr. J. Whitehead<sup>2</sup> states that "it is evident that fluid injected within the uterine cavity, *without force* and in small quantity, may mount by ciliary action through the Fallopian tubes into the peritoneal cavity with great quickness." Dr. Simpson, in his Diseases of Women, says, "Never think or dream of throwing liquids into the interior of the uterus by means of any injecting apparatus, for severe and fatal inflammations are very likely to ensue. Such a result may perhaps be caused by the fluid running along one or other patent Fallopian tube, and escaping into the peritoneum; more probably it may be due to laceration of the mucous membrane and entrance of the fluid into one of the uterine veins." Dr. T. G. Thomas (Diseases of Women) says "there can be little doubt" that this accident may occur, and he alludes to a fatal case mentioned by Von Haselberg, where, after an injection of an iron solution, "the metal iron was detected by chemical tests in one tube." If the danger of injections penetrating the tubes be so manifest in the non-gravid uterus,

<sup>1</sup> Read before the Massachusetts Medical Society and recommended for publication in the JOURNAL.

<sup>2</sup> British Medical Journal, 1873.

it is obviously greater in the relaxed post-partum uterus, when, if the syringe be carried directly to the fundus, as Dr. Barnes directs, and the injection is made slowly, the speedy exit of the fluid, which safety demands, is interfered with by the horizontal position of the woman and the blocking up of the uterine cavity by clots. The *British Medical Examiner*, March 15, 1874, contains a report of a case which is conclusive evidence of the risk of penetrating the tubes. In this instance injection of a solution of perchloride of iron was followed by death in thirty hours, the autopsy revealing an ink-black clot in the right Fallopian tube and adjacent peritoneal surface, with unmistakable signs of inflammation. Even a vaginal injection may cause a like disastrous result, as is shown by a case which Dr. T. More Madden reported in 1875, where metro-peritonitis occurred eighteen days after delivery, and was caused, evidently, by the astringent injection finding its way into the uterus and through the Fallopian tubes into the peritoneum. The absorption of fluids by the lymphatics with which the mucous membrane of the uterus is supplied, and their conveyance by the abdominal lymphatic chain to the peritoneum, is also a recognized source of danger. The experiments of Klemm upon the cadaver showed that sometimes blue ink injected into the uterus with only moderate force found its way into the venous system and broad ligaments without any apparent laceration of surface. It is the possibility of such accidents that leads Playfair to say, "The evidence is overwhelming that intra-uterine injections, however carefully practiced and however small in amount, are apt to be followed by very alarming if not dangerous symptoms." This, said of injections into the non-puerperal uterus, applies with still greater force to the uterus after delivery.

Alarming and fatal results from the entrance of air into the circulation have sometimes followed uterine injections. The sinuses in the relaxed uterus, standing open like the veins in bone, and, if Dr. Barnes's supposition is correct, possessing, by their nearly emptied condition consequent upon severe hæmorrhage, "a certain suction action," afford dangerous possibility of the passage of air to the heart through the valveless pelvic veins and the vena cava.

Dr. Barnes relates a case in which death occurred "suddenly, soon after the injection, with symptoms resembling those consequent upon air entering the circulation." Dr. Olshausen reported a case (1864) in which a vaginal douche of water was used to expedite a lingering labor; after eight minutes' use the patient began to complain of oppression, and in a minute, at most, was dead. The autopsy showed air bubbles in the uterine sinuses, the right broad ligament, the vena cava ascendens, which was enormously distended, and in the right cardiac ventricle. It was concluded in this case that the tube of the syringe had entered the uterine cavity, that the force of the injection

had separated the placenta, and that air taken up with the water had been driven into the uterine veins. Schroeder, in his work on Midwifery, says, "It is unmistakably shown that death may take place when by means of an injection apparatus air is forced with the water into the uterus under a certain pressure;" and where injections are used in parturient or lying-in women, he emphasizes the necessity of *every bubble* of air being previously removed from the syringe, a warning somewhat difficult to heed at the time of one of those frightful hæmorrhages which demoralize patient and friends, when, as frequently happens, the physician may have no competent assistant, and the woman is in the dangerously restless condition that often accompanies flooding.

Stimulated by Dr. Barnes's example and teachings, there has arisen among many eminent obstetricians an enthusiastic advocacy of the use of injections of the per-salts of iron in post-partum hæmorrhage, which have been used so frequently that we are compelled to one of two conclusions: either that there has been an alarming increase of emergencies demanding such heroic treatment, or that the injections have sometimes been used unnecessarily. That the use of iron injections is attended with special risk is evident from the statement of Dr. Ringland before the Dublin Obstetrical Society, that out of forty-five cases of post-partum hæmorrhage treated by the perchloride of iron, eleven terminated fatally, an undeniably large proportion of deaths from this cause. In a recent discussion before the Obstetrical Society of Edinburgh, Dr. Matthews Duncan affirmed that, "unfortunately for the boastings, women had died from post-partum hæmorrhage apparently more than ever, and even when the vaunted remedies of perchloride of iron and transfusion — both declared to be inestimable and sovereign — had been employed with skill."

One of the risks which must always attend the introduction of the salts of iron into the uterine cavity after delivery is that the coagulating effect may not be limited by the uterine walls, but may extend to the venous circulation, with possible death from embolism. Sudden death has followed injections of solution of iron into *nævi*, accounted for by post-mortem evidence of coagulated blood in the vessels and heart; is it more strange that the iron can reach the heart by way of the valveless uterine and pelvic veins and the vena cava? Dr. Barnes does not consider the two conditions analogous, but they are at least very similar: the iron is introduced into the circulation, though in both cases it is intended that there shall be a local coagulation only. Playfair's explanation of the action of the iron, "We now have abandoned contraction as a hæmostatic, and are trusting to thrombosis," implies, although it does not verbally recognize, the danger of embolism. Death has occasionally followed suddenly from this cause. Dr. Cederskiöld re-

ported to the Swedish Medical Society a case where the patient died before the injection (one to seven ferri perchl.) was completed. The autopsy showed dark-brown blood clots in all the vessels from the uterus to the heart, as well as in the peritoneal cavity. Moreover, in this case, the vessels were filled with air bubbles, making an instructive example of the danger of penetration of the tubes, entrance of air into the circulation, and chemical destruction of the character of the blood in the venous system. An instance of the danger attending the use of iron solutions in the surgery of the uterus is given by Dr. Spencer Wells, in the London *Medical Times*, 1862: "Serious cardiac and pulmonary symptoms, with the almost instantaneous appearance of a rash like erysipelas or scarlatina all over the body, followed the application of tincture of perchloride of iron to a cauliflower excrescence of the uterus; in this case clots of various sizes were found in almost every vessel examined after death." In the London *Lancet*, 1867, Dr. Playfair reports three cases in which symptoms of pulmonary embolism appeared after labor, the patients all recovering. In two of these cases there was post-partum hæmorrhage, in one of which iron was injected. In his remarks upon these cases he says, "In two of the three there was post-partum hæmorrhage, and a tendency therefore to coagulation from the altered condition of the blood," which condition he considers to depend upon excess of fibrine favoring spontaneous thrombosis; he makes no mention, however, of the iron injection as a probable cause of the embolism, which is somewhat singular when he explicitly states that its efficacy consists in its plugging the sinuses with thrombi. Had he called attention to this fact in his remarks upon the three cases of embolism, it would have rendered still more forcible his conclusion that "the main element in the treatment of such cases is the most rigid rest."

An accident liable to follow iron injections, and one that will serve more than anything else to deter physicians from using this treatment, is the occurrence of septicæmia. Dr. Sims recently stated that in his opinion the advocates of the practice in London are beginning to be afraid of the injections for this reason. The septicæmic symptoms are the result of the retention and decomposition *in utero* of the hard clots formed by the blood and the solution of iron. Dr. Emmet writes, "Under no consideration would I inject persulphate of iron into a cavity to arrest hæmorrhage. It possesses in itself no styptic properties, and only coagulates a mass of blood, which then acts mechanically. The blood is so destroyed in character by contact with the persulphate that it undergoes decomposition within a few hours. From this source the patient frequently becomes blood poisoned before any septic element has been generated elsewhere." Dr. Thomas considers the danger of septicæmia from this source as "very grave." Dr. Lusk lost a patient

from this cause, concerning which he writes me that it has warned him never to use a remedy to coagulate the blood directly in such cases. The cases reported by Dr. Snow Beck prove to any but prejudiced observers that the septicæmia which caused the death of the patients was due to the effects of the solution of iron. Reports of fatalities asserted to be due to iron injections have been set aside as not proved by enthusiastic advocates of the practice, who have affirmed that septicæmia, metro-peritonitis, pyæmia, etc., are just as likely to follow post-partum hæmorrhage treated by what are called "ordinary means." Were this true it must be considered bad practice not to use the iron injection upon the immediate occurrence of hæmorrhage, before excessive loss of blood shall of itself predispose to subsequent inflammation and blood poisoning. The postponement of this treatment until other means have been tried in vain is a tacit confession that the risks alluded to *are* increased by the effects of the iron. Dr. Barker mentions first, among the causes of septicæmia, the decomposition and absorption of uterine clots, and with regard to peritonitis he says, "It has long been settled by the best pathologists that peritonitis is rarely a spontaneous and primitive disease. It is generally associated with some inflammation either of the uterus, the ovaries, the Fallopian tubes, or the broad ligaments." It is manifest that inflammation of these parts is less liable to occur spontaneously than as a consequence of the hard, irritating clots formed by the iron. In any condition of the uterus a dangerous application, the dangers attending its use are greatly increased by postponing it until the contractile power of the uterus is lost and all the conditions for introduction of the iron into the veins or through the Fallopian tubes into the peritoneal cavity, with possible septicæmia as a result, are in greatest force. Even those authorities who sanction the use of iron injections advise subsequent measures to reduce to a minimum the possibility of danger from decomposition of uterine clots. On the same page in his work on Midwifery, Dr. Playfair reassures skeptics by asserting that no one has yet brought forward any cases in which the evil effects of injections of perchloride of iron have been conclusively proved, but a little lower down he refers to a case of his own, in which septicæmia followed the use of an injection; upon consideration of which case he advises the use of antiseptic injections to prevent the decomposition of the retained clots. Dr. Chadwick writes that it is his "belief that many of the fatal results observed after injections of iron might be prevented by subsequent disinfecting injections." To prevent infection the antiseptic must be used within a few hours after the iron injection, must be frequently repeated, and, with however much care applied, may fail to reach the thrombi which Dr. Playfair supposes to fill the sinuses, in which event complete disinfection is not secured. Theoretically the use of subsequent antiseptic

tic injections might be rendered needless by combining with the solution of iron a proportion of salicylic acid, which Bartholow asserts to have "the power to prevent fermentations and putrefactive decomposition," and which, also, judging from the sharp temporary irritation I have seen to follow its application to the cervix uteri, might increase the excito-motor action of the injection. That iron injections almost invariably and immediately check post-partum hæmorrhage is undeniable, but it is by no means proved that their styptic or coagulating property, upon which their value as hæmostatics has been asserted principally to depend, is the most important factor in their action. Dr. Barnes states that the blood is instantly seized and coagulated at the mouths of the vessels, and also that the inner surface of the uterus is constricted by the action of the iron, this constriction being a further aid in closing the vessels. I think that the constricting action alone, supposing contraction does not follow the injection, is the essential factor in checking the flow, and that coagulation alone could not accomplish that result unless the solution penetrate the sinuses deeply. The effort to stop a bleeding in other parts of the body—for example, from a tooth socket—is sometimes unavailing, even though the undiluted tincture is used and the cavity plugged; the sinuses, kept open by uterine relaxation, offer an analogous condition, and it is unreasonable to suppose that a solution of iron, of which nine tenths are water, if Dr. Barnes's directions are followed, can check by mere coagulation a profuse post-partum hæmorrhage. If this view be correct, the coagulating property is an unnecessary element of danger, and simply a disadvantage which should be overcome by substituting for the iron an agent of equal astringent power, one that does not coagulate the blood and that is equally effective in exciting uterine contraction, which is the only safe hæmostatic. Many obstetricians claim these advantages for iodine. Its use as a remedy for post-partum hæmorrhage was first advocated by M. Dupeirris, of Havana, in the *American Medico-Chirurgical Magazine*, 1857, who, Playfair states in his work on Midwifery, has reported twenty-four cases in which he applied it with immediately successful result and no subsequent ill effects. Dr. Emmet states that he has used Churchill's tincture of iodine to maintain uterine contraction after the removal of fibroids for more than ten years, and its action is certain to arrest bleeding unless there exist some impediment to the proper contraction of the uterus; he also considers it a most valuable antiseptic. He writes me that for years past he has advised the use of hot-water injections and Churchill's iodine in post-partum hæmorrhage, and that both have been used in New York at his suggestion. Dr. Barker writes that he has used iodine twice with satisfactory results; Dr. Peaslee, that he prefers iodine to iron, "as being quite as efficacious and not so objectionable; the after-effects of iron are often bad, those of

iodine not so, as far as I know." Dr. T. G. Harrison reports a case of hæmorrhage successfully treated by injecting two drachms of Churchill's iodine. At a meeting of the American Medical Association, 1876, Dr. Larrabee, of Kentucky, reported that iodine was much used in Louisville in such cases. Dr. Wilson, of Pennsylvania, in a case of irrepressible hæmorrhage that continued several days after delivery, had at last resorted to tincture of iodine. The uterus, although only three or four drops were injected, at once contracted and remained so. In a valuable paper entitled *Injections of Tincture of Iodine into the Cavity of the Uterus after Delivery*, read in 1874 before the New York Medical Society, Dr. J. D. Trask makes the following statements: "As an excito-motor agent iodine is probably at least equally good [as iron], while incapable of causing the formation of dangerous thrombi in the uterine vessels. . . . The application of iodine to the lining membrane of the uterus is probably of all things the surest means of counteracting a tendency to absorption of septic matter after delivery. Since adopting the practice of injecting iodine after operations upon the interior of the uterus, Dr. Emmet has not encountered a single case of septicæmia." Dr. Trask disavows the position of claiming positively for iodine a superiority over iron, as he thinks that in extremely rare instances it *may* be impossible to excite uterine contraction, in which cases the iron is theoretically more powerful; but my investigation does not show me any cases in which the iodine failed to induce contraction. That iodine is a direct excitor of muscular action is shown by its effect upon the non-gravid uterus. In the *Lancet* for January 6, 1866, Dr. Murray states that "the muscular contraction that follows this injection is remarkable, the tube carrying the iodine being tightly grasped so that its reintroduction at the time is extremely difficult." Drs. Barker, Emmet, Wilson, and Harrison have used the undiluted tincture, a practice much more likely to be followed by immediate contraction than either diluted iodine or iron. Incapable of causing the formation of thrombi, and therefore not demanding the use of subsequent disinfecting injections, requiring but a small quantity if used in full strength, hence reducing the danger of penetrating the tubes and sinuses, we should be justified in using iodine much earlier than iron, thus preventing absolute loss of contractile power and being saved the necessity of resorting to a remedy of *possibly* greater power and *certainly* greater danger.

Of injections of cold water I will only say that, though widely recommended, they are not to be depended on if postponed until great exhaustion occur; if not followed by immediate contraction the prolonged use, by lowering vitality, does much harm. Of hot-water injections Dr. Emmet asserts that "very hot water is a prompt excitor of uterine action." Dr. Windelband<sup>1</sup> states that he has used injections of

<sup>1</sup> British Medical Journal, 1875.

water at about 100° F. in twenty-one cases of abortion, in cases of severe hæmorrhage from placenta prævia, in post-partum hæmorrhage, etc., and he is convinced that the hot water exerts a far more energetic action on the muscular structure of the uterus than cold water either alone or with astringent remedies in solution, and he has never found any disadvantageous results.

Injections of matico, vinegar, lemon juice, and other astringent and irritating substances have been brought into notice as invaluable in treating post-partum hæmorrhage, but certain strictures apply to all: entrance of air into the circulation, penetration of the tubes and sinuses, with possible systemic blood poisoning as results, attach to each. Because the use of intra-uterine injections in post-partum hæmorrhage, especially of those containing iron, is becoming common, I have deemed it not inopportune, by setting forth the views of prominent obstetricians, to call attention to the dangers of the practice rather than the advantages, for heroic measures sanctioned and lauded by high authorities are sometimes blindly resorted to by physicians of more limited experience. That such injections are sometimes the only hope of safety in post-partum hæmorrhage may not be gainsaid, but it should also be kept in mind that dependence upon such remedies causes too ready resort to them and, more than that, the neglect of the most important part of the treatment, *prevention*. Dr. Trask says, very justly, in alluding to the statement which Dr. Hicks made with regard to having employed the iron injections "a great number of times," "No matter how extensive a man's practice may be, he can scarcely have met with a great number of cases in which the conditions are those which Dr. Barnes prescribes," namely, absolute loss of contractile power. That cases of alarming flooding are not checked before the necessity arises for styptic injections is sometimes the physician's fault, for it is his duty, not the patient's, to see that the means for meeting such an emergency are always within reach. His obstetric bag should contain not only his forceps and his favorite styptic, but also ergotine, brandy, ammonia, morphia, ether, hypodermic syringe, and hand-atomizer. If none of these are needed for ninety-nine cases out of one hundred, in the hundredth case the trouble of carrying them will be amply repaid by having them at hand when needed, and the physician may be spared the unsatisfactory reminiscence of a case of flooding which resulted fatally because the remedy which was sent for arrived too late. I have mentioned ether and an atomizer as necessary adjuvants because several cases have been reported (one by Dr. Hicks and another in the *Medical Record*, April 7, 1877) in which ether spray applied to the hypogastrium was followed by immediate uterine contraction. This method of exciting reflex action possesses obvious advantages over the application of ice. From a consideration of the fact that in Dr. Wilson's case it was nec-

essary to inject a very few drops only of tincture of iodine, we may conclude that the same effect would follow the same remedy applied upon a sponge or swab, thus substituting a safe for a dangerous method. The solution of iron may be employed in the same way or in a solid form, as has been done by Dr. Ringland, with results as immediately successful as those attending iron injections. Of this method Dr. J. More Madden writes me, "I have also, in a few instances, employed the solid perchloride of iron with very satisfactory results, but whether this was altogether due to the styptic I much doubt, as probably the introduction of the hand containing the salts into the uterine cavity had no small share in exciting the uterine contraction by which the hæmorrhage was arrested," certainly a strong argument against the hasty use of intra-uterine injections.

Women who have suffered from hæmorrhage in previous confinements, those who are delivered by forceps, especially when under the influence of an anæsthetic, those who suffer from tedious labor dependent upon any debilitating cause, and those whose labors are exceptionally rapid, with very short intervals between the pains, are especially liable to post-partum hæmorrhage; in all these cases anticipating measures are of great importance, and as it is never superfluous to reiterate useful directions, I will conclude by calling attention to several important points: In a case in which hæmorrhage occurs it is well to rupture the membranes as soon as the os is fully dilated, as Dr. McClintock recommended; to inject subcutaneously a dose of ergotine as soon as the head presses upon the perinæum (ergot by the stomach is not so sure to act, and is useless if the hæmorrhage occur immediately upon the birth of the child); always, and above all, to follow down the fundus with a firm hand which shall not be removed, unless it can be replaced by an equally trustworthy one, until firm contraction has existed for at least half an hour after complete delivery. I believe that in very many cases the binder is used too early, and that however scientifically applied it cannot exert compression as completely as does the hand. It cannot prevent uterine relaxation, and its early application over an imperfectly contracted uterus merely gives the physician a feeling of security which has no better foundation than that which the ostrich is supposed to have when it thrusts its head under the sand to escape danger; he *hopes* he is all right, but he lacks common sense. The emphatic direction of Dr. Meigs, in lecturing on post-partum hæmorrhage, was, "Turn out the clots." If this were done thoroughly upon the immediate occurrence of flooding, and at the same time ether spray applied to the abdomen, the emergencies demanding irritant uterine injections would be exceedingly rare.

REPORT OF TWO CASES OF AMPUTATION THROUGH  
THE KNEE-JOINT, WITH REMARKS.

BY GEORGE A. MURSICK, M. D., NYACK, N. Y.

CASE I. O. S., aged fifteen years, a well-developed mulatto boy, in December, 1873, fell, while getting from a wagon which was in motion, and struck the upper part of his left leg against the iron tire of the wheel. The blow was followed by an inflammation of an acute character which terminated in an abscess of the head of the tibia. This had opened externally. I first saw him in June, 1874, when I found the upper end of the bone much enlarged. The leg was curved inward so much that when he stood erect the left foot crossed the right ankle, and did not touch the ground. There were several openings on the anterior upper half of the leg, from which pus flowed freely; the skin was thin and brown in color, and the periosteum was separated from the anterior upper half of the bone. A probe passed through the upper opening an inch and a half into the bone, upwards and backwards towards the joint, which contained a moderate amount of fluid.

He does not remember when the abscess burst, but thinks it was some three or four months since.

June 15th. His general condition was good, but the bone was so extensively diseased that I thought it best to amputate the limb through the knee-joint, which I did by the circular method. The patella had been displaced inward by the curving of the limb, and did not fit well between the condyles of the femur, so I removed it.

He suffered but little constitutional disturbance after the operation. Before it his pulse was 78, and after it 90; and it fluctuated for several days between 90 and 100. At no time after it did the temperature rise above 100°. The stump healed readily; the ligatures came away June 22d, and on the 28th he was walking about on crutches.

During the after-dressing of the stump care was taken to draw the edges of the flap well backward, so that when the wound healed the cicatrix would be along the posterior border of the condyles of the femur, where it has remained to the present time.

Examination of the limb after removal showed the periosteum to be extensively separated from the anterior surface of the bone, which was much roughened and bathed in pus. Upon section of the bone with a saw the abscess was found to be very large; it extended upward nearly to the articular cartilage. The effusion into the joint was found to be synovial in character. Without going farther into the details of its pathological appearance, I will state that it appeared to me to bear a close relation to, if it was not identical with, what Markoe<sup>1</sup> describes as "chronic sinuous abscess of bone." The disease was too far ad-

<sup>1</sup> Diseases of the Bones, page 33, et seq.

vanced to follow the treatment advised by him, namely, the chiseling out of the whole of the diseased bone. The bone after maceration was deposited in the Army Medical Museum at Washington; specimen No. 6659, Surgical Section.

CASE II. Fred Q., aged eleven years, while running behind a wagon, May 23, 1876, got his right leg caught between the spokes of the wheel which was revolving rapidly, and received a compound comminuted fracture of the tibia and fibula, with extensive laceration of the muscles. The periosteum was stripped clean from the bones for about five inches. This was probably done by the twisting of the leg in the rapidly revolving wheel.

At three o'clock P. M., about four hours after the reception of the injury, I saw him in consultation with his attending physician, Dr. C. H. Masten. He had in a great measure recovered from the shock of the injury, and was lying upon his bed apparently unconcerned about it. There being no hope of saving the leg, I amputated it through the knee-joint, by the circular method, making the incision in this case about three inches below the lower border of the patella, which *was not* removed.

Everything did well after the operation. He suffered little or no constitutional irritation; the stump healed rapidly; the ligatures came away in due time, and in two weeks after he was out-doors on crutches.

In dressing the wound care was taken, as in the preceding case, to keep the line of cicatrix well back from the face of the stump, where it has since remained, so as to avoid pressure upon it, should he wear an artificial limb.

Remarks: It will be noticed that both subjects of this operation were boys, and that one amputation was done for chronic disease, the other for an acute traumatic injury. Both were done by the circular method. In one case the patella was removed; in the other it was left *in situ*. Little or no constitutional disturbance followed either operation, and the stumps healed rapidly. They are broad and firm, and afford an excellent support for an artificial limb, far superior to any thigh stump, or even to the knee after amputation of the leg at the point of election. I do not find that there is any difference in the utility of the stump, whether the patella be retained or removed. The danger to life is much less than amputation through the thigh; and the liability to osteomyelitis and pyæmia, with the consequent fatality, is a great deal less than after amputation through the continuity of the femur, or through the tibia and fibula. In view of these facts, after considerable personal experience in, and after extended observation of, amputations through the continuity of long bones, I am led to the conviction that — other things being equal — all amputations in the continuity of long bones in the vicinity of joints should be avoided, where

it is possible to disarticulate from the lower aspect of the articulation, whether in the lower or upper extremity, with one exception, namely, that of the *elbow-joint*. This exception is apparent for very obvious reasons.

To the elaborate papers of Markoe, in the *New York Medical Journal* for March, 1868, and of Brinton, in the *American Journal of the Medical Sciences* for April, 1868, the reader is referred for much valuable information concerning this amputation. Their able discussion of this subject has left but little to be said by subsequent writers; but the reports of additional cases will tend to confirm or modify their conclusions.

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### ANNUAL REPORT FOR HAMPDEN DISTRICT.<sup>1</sup>

F. W. CHAPIN, M. D., SPRINGFIELD, REPORTER.

THE past year has been one of unexampled health in Hampden County. Within the memory of the oldest practitioners there has never been so little call for medical aid.

Among the comparatively few cases observed by our physicians during the past year the following are of some interest:—

CASE I. occurred in the practice of Dr. P. LeB. Stickney, of Springfield. William S., aged nineteen, took up a loaded gun by the muzzle. A large piece of the inner side of the right fore-arm was blown away, including a considerable part of the muscles arising from the inner condyle. A small opening was made into the elbow-joint, exposing a portion of the articular cartilage about an eighth of an inch square. A small piece of the ulna, just below the joint, was torn off, and the whole wound was blackened and filled with powder. It was feared that inflammation of the joint would follow and terminate in ankylosis. A poultice was applied for two days, hastening the separation of the superficial portions which had been blackened and destroyed by the explosion. The wound was then dressed with sheet lint kept wet with a solution of carbolic acid, and covered with oil-silk. The healing progressed rapidly. For some time the joint remained open, and the patient, by flexing and extending the fore-arm, could work out clear synovial fluid through the opening. By and by the granulations shot up and covered in the opening. A portion of the ulnar nerve, about two inches in length, was blown away with the other tissue, and the upper end was exposed for some time, giving great pain when anything touched it.

Cicatriztion of the wound is now (June 1) complete. Sensation is abolished in the fingers supplied by the ulnar nerve. Flexion of fore-arm, wrist, and fingers is somewhat impaired.

CASE II. was under the care of Dr. John Hooker, of Springfield.

<sup>1</sup> Read before the Massachusetts Medical Society, June 13, 1877.

Michael H., aged twenty-two, while standing on a truck fell backwards, striking the back of the neck on a bar of iron. On examination the spinous processes of the fifth and sixth cervical vertebræ were found to be broken. There was complete paralysis of the lower extremities, bladder, and rectum, and almost complete paralysis of the upper extremities. The head was fixed. The patient was taken to the almshouse and put on his back. On the fourth day an extension apparatus (weight and pulley) was adjusted to the head by means of two broad bands of webbing passing under the chin and occiput. To this a weight of twenty-eight pounds was suspended. During the third and fourth days the patient took forty-eight grains of calomel. On the fifth day, after an injection, he had a copious discharge from the bowels, and passed water. He began to improve slowly from this time, gradually regaining his natural power over the paralyzed members. The extension apparatus was kept on for six weeks, the weight being gradually lessened after the third week, and being taken off occasionally to rest the patient, an hour or so at a time. The bowels were moved twice a week with a mercurial cathartic. At the end of six weeks the patient could sit in a chair. After eight weeks he could bear his weight on his feet. In twelve weeks he walked a little. In five months he was out in the street, walking with an uncertain, straddling gait, as if he feared falling. In twelve months he resumed his occupation, that of painting.

The exact form of injury in this case was, of course, not discoverable, but it was thought there was probably some displacement or fracture of the vertebræ, together with extravasation of blood about the cord.

CASE III. is that of a young married woman who applied to one of the members of our society for something to bring on her courses, as she had passed her monthly period several days. The doctor, for obvious reasons, advised her to take no such measures. About seven weeks later he was called to see her. It was in the afternoon. He found her pale and weak, suffering severe abdominal pain and distress, with slight hæmorrhage from the vagina. She supposed she was about three months pregnant; denied having miscarried, and said that no abortion had been attempted. Her story was that three days before she had been seized, while driving, with hæmorrhage from the vagina and violent pain in the abdomen. From that time to the present attack she had suffered moderate hæmorrhage, but no pain nor distress. Dover's powder and brandy were ordered. The next morning at ten o'clock she appeared much better. The hæmorrhage was slight. The doctor was in doubt whether she was suffering from menorrhagia or was having a miscarriage. He left her comfortable. At two P. M. he was called in haste. The patient was in terrible distress all over, rolling from side to side, almost pulseless, very pallid, but conscious and able to answer questions. In the act of answering one she died.

*Autopsy*, seventy-two hours after death. In the abdominal and pelvic cavities large masses of clotted blood were found, not less than two pounds in weight. On removing this everything appeared normal, except that the pelvic organs were stained from contact with the blood. Vagina healthy. Uterus enlarged to capacity for a three months' foetus. No signs of inflammation. The cavity held a dark clot about two ounces in weight. A portion of the wall of the organ showed marks of recent placental attachment. On the upper wall of the left Fallopian tube, about half an inch from its junction with the uterus, was found a slit-shaped opening capable of admitting an instrument three sixteenths of an inch in diameter. The opinion of the gentlemen present was that the opening had been made with a slender instrument introduced for the purpose of inducing an abortion; that the patient had died from uterine hæmorrhage, a large part of the blood having passed into the abdominal cavity through the opening in the Fallopian tube.

CASE IV. is in some respects similar to the last. A young unmarried woman, a patient of Dr. L. S. Brooks, died with symptoms of metritis and septicæmia. Circumstances seemed to involve one or two well-known abortionists in the case, and an autopsy was ordered by the coroner. A small opening was found through the uterine wall into the pelvic cavity, at the junction of the neck with the body. There was intense congestion of the ovaries and pelvic peritoneum. Pus was found in the Fallopian tubes and uterine sinuses. The uterus was considerably enlarged. Here, again, some slender instrument was probably used, or, rather, misused.

CASE V. A woman, patient of Dr. George C. McClean, miscarried without apparent cause, about the fourth month. The foetus was expelled enveloped in the membranes, which were intact and completely covered with a thick, soft membrane, resembling the decidua reflexa. The foetus is about six inches long. The thumbs and little fingers are very large, proportionately. The other fingers in each hand are twisted together apparently, and terminate in a fibrous cord, an inch in length, which connects the hands together. One hand is also attached to the inner surface of the membranes by a cord two and a half inches in length. The small toes of one foot have an appearance similar to that of the hands.

CASE VI. Dr. McClean also reports two cases of separation of the epiphysis of the internal condyle of the humerus in boys aged seven and eleven, respectively. In the latter case the cause of the accident was muscular action; the boy threw a ball with all his might and immediately felt pain in the elbow. Examination revealed the injury already mentioned. The doctor thinks the sudden and powerful action of the pronator radii teres, in the act of throwing, caused the separation.

CASE VII., is one of embolism of the extremities. William F. H., aged fifty-two years, married, by occupation a carpenter. Patient never was very rugged; had typhoid fever at the age of twenty-one, and three severe attacks of rheumatic fever between the ages of twenty-five and thirty-five. Otherwise he was always well till the present trouble began, in the spring of 1875. He was taken one morning, while dressing, with a cramp in the left arm. Soon the whole arm was absolutely powerless and perfectly white and cold. Dr. E. M. Pease, the family physician, being out of town, the patient awaited his return, his friends employing the intervening time in rubbing the arm briskly. At the end of a few hours they had succeeded in restoring color, warmth, and power to the arm as far as the wrist; the hand remained numb, white, and cold. The doctor arrived at the end of six hours and began at once the use of the faradic current on the hand. Gradually the member swelled up and became "as black as a stove," and very painful. It remained so for several days. Attempts were made to reduce the swelling by means of poulticing and sweating the hand, and finally by lancing. It gradually improved after a few days; the faradic current was resumed, and in two months the patient went to work, though the hand was stiff and troublesome for several months. It is still a little stiff and weak.

On February 6, 1877, he was taken again with cramp in the same hand, but an hour or two of faradism and rubbing caused the symptoms to vanish.

February 9, 1877, he was attacked with severe cramp along the outside of the left leg. The pain increased rapidly, and in about one minute the leg felt as if it were screwed up in a vise; it turned white from about the middle downwards, and cold, as did the foot also. Dr. Pease worked two hours with a faradic battery, and finally restored the circulation so that the leg resumed its natural color and warmth. There was some lameness, but everything looked favorable. In a day or two, however, the foot began to be painful and to swell and assume a purplish color. For two or three days these symptoms were made to disappear by rubbing and by means of faradism, but at the end of that time the circulation became permanently impeded. All the symptoms of gangrene supervened slowly; the line of demarcation formed in about eight weeks, at the ankle-joint. A slough of considerable size also occurred on the outside of the leg just above the ankle, and through the opening thus made large pieces of tendon and muscle sloughed out.

On May 10, 1877, Dr. P. LeB. Stickney, assisted by the writer, removed the foot, Dr. Pease having gone to the Micronesian Islands. At the present date the stump looks well, granulations having partly covered the ends of the bones, and the opening above the end having partly closed up.

The patient is weak, but is now improving. Examination of the heart reveals mitral presystolic and regurgitant murmurs. The pulse is small, feeble, almost fluttering, occasionally intermitting, and beats about 130 times to the minute.

The theory of this case is, of course, that emboli became detached from the mitral valve and plugged up arteries in the affected extremities; that the improvement in the symptoms brought about by electricity, friction, and manipulation, was the result of dislodgment of the embolus and its propulsion into an artery of small size, where collateral circulation was more easily established.<sup>1</sup>

CASE VIII. is one of disease and removal of the upper jaw. Mr. H. K. E., a patient of Dr. E. F. Parsons, of Thompsonville, Conn., received a blow upon the left cheek from a sled-stake in February, 1875. Severe pain and some swelling followed, but passed away in the course of a week or ten days. Six months later there began a bloody discharge from the left nostril. Early in the spring of 1876 pain began about the spot where the blow had been received. The discharge from the nostril continued to be annoying. In September, 1876, the left cheek, over the antrum, began to swell. In November the pain grew worse; the discharge became more bloody and more copious; the swelling also was more prominent, and, in December, projected into the mouth below the antrum.

The antrum was punctured January 9th; a copious discharge of blood and unhealthy pus followed. Apparent improvement was the result for a month, the swelling remaining stationary, and the pain subsiding. It was not long, however, before the symptoms returned with increased severity, the pain causing much loss of sleep. The patient was now confined to the house.

On March 21, 1877, the left superior maxillary and malar bones were removed by Dr. David P. Smith, of Springfield. The patient was placed in an armed rocking-chair and thoroughly etherized. An incision was made down to the bone, dividing first the lip, in the median line, up to the septum nasi, thence extending outwards under the left nostril, around the corner of the nose, and perpendicularly upwards to a point just below the floor of the orbit, thence outwards to the zygomatic arch.

The advantages of this incision over the old-fashioned one from the zygoma to the corner of the mouth were apparent, as the skin and fasciæ were dissected from the cheek and the whole flap was laid over downwards and out of the way. The bones were more thoroughly and easily exposed; and the operator was enabled to see his way clearly, and to finish the operation unembarrassed by an overhanging flap.

<sup>1</sup> For a valuable article on Embolism of the Arteries of the Extremities, see *New York Medical Journal*, March, 1874.

The soft palate was left entire. Blood was easily removed from the mouth during the operation by rocking the patient forwards, and swabbing the mouth with a sponge. There was no troublesome hæmorrhage. A few bleeding points, deep down, were touched with the hot iron. The wound was stitched, strips of sheet lint being stuffed into the cheek to support the flap. No ether was given after the beginning of the cutting, but anæsthesia was complete during nearly the whole procedure.

The wound healed rapidly externally. The patient's health has gradually improved since. There is now, May 26th, a very slight discharge, occasionally, from the inner part of the excavation under the eye, with slight soreness and more or less discomfort about the wound. The general health is good, and the flesh is increasing. The patient eats all kinds of food, and is beginning to attend to business, out-doors and in, every day. The deformity is lessening. Articulation is somewhat impaired.

The mass removed was about the size of a turkey's egg, solid, somewhat tough and porous, and partly soft. There was no trace of true bone except in a small part of the superior maxillary including the last molar tooth.

The microscope showed fibrous tissue with numerous cells, small, round, oval, or caudate, having from one to three nuclei, also numerous fat globules.

CASE IX. is one of fracture of one of the dorsal vertebræ. The early history of this case was given in last year's report from this district.<sup>1</sup> From the date of that report the patient remained in about the same condition till near September 1st, when he was transferred to the city almshouse. There he became unhappy, lost his appetite, failed, and died of exhaustion September 21, 1876.

The *autopsy*, September 22, 1876, revealed the following points of interest: There was a large slough over the sacrum down to the bone, and a slough on each heel. The mucous membrane of the bladder, ureters, and pelves of the kidneys was in a state of chronic inflammation, and covered with urine, pus, and phosphatic deposit. In the pelvis of the right kidney were several calculi, one of which measured seven eighths by five eighths by one fourth of an inch. The spinal cord and broken vertebræ were, of course, the chief objects of interest. A portion of the cord a foot or so in length, including the seat of injury, was removed, together with a portion of the spinal column including the fractured vertebræ. They are still in my possession. The tenth and eleventh dorsal vertebræ are dislocated and broken, the tenth having been crowded downwards and forwards over the eleventh, carrying with it a chip from the antero-superior portion of the body of the

<sup>1</sup> Vide JOURNAL, July 27, 1876, page 113, Case viii.

eleventh; while the eleventh is crowded upwards and backwards behind the tenth, carrying with it a chip from the postero-inferior portion of the body of the tenth, and forming a projection into the spinal canal. Between this projection and the posterior wall of the canal the spinal cord was pinched. The cord makes a beautiful specimen, distinctly showing the portion which suffered from the pressure. This portion is about an inch in length and much thinned, allowing light to pass through it readily.

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## RECENT PROGRESS IN PHYSIOLOGY.<sup>1</sup>

BY HENRY F. BOWDITCH, M. D.

### VASO-MOTOR MECHANISM.

LÉPINE's conception of the vaso-motor mechanism as consisting of a terminal apparatus and two sorts of nerve fibres is the same that has, with various modifications, been adopted by nearly all recent observers. Thus Huizinga,<sup>2</sup> as the result of his experiments on curarized frogs, concludes that the vaso-motor apparatus consists of

I. Local ganglia presiding over the rhythmical contraction of the vessels.

II. Spinal vaso-constrictor fibres going directly to the arteries.

III. Spinal nerve fibres inhibiting the local ganglia.

IV. Inhibitory fibres from the skin to the neighboring ganglia.

A local irritation of the skin may cause either vascular dilatation through IV. or vascular constriction through II. Which result is produced depends upon the locality and the intensity of the irritation. The nearer the irritated part to the blood-vessels under observation, and the stronger the stimulus, the greater is the tendency to the production of a vascular dilatation instead of a constriction.

Masius and Valnair<sup>3</sup> hold essentially the same views, except that they regard the spinal vaso-constrictor fibres (II.) as acting through the local ganglia instead of directly on the vessels, and they admit the existence of exciting as well as inhibitory fibres running from the skin to the neighboring ganglia.

All recent investigators unite in assuming the existence of nerve cells in or near the vascular walls to account for the recovery of their condition of tonic contraction after section of the spinal nerves, but it should be borne in mind that histologists have as yet only rarely succeeded in bringing anatomical evidence in support of this assumption.

Inasmuch, however, as we find in the walls of the small intestine a

<sup>1</sup> Concluded from page 68.

<sup>2</sup> Pflüger's Archiv, xi. 207.

<sup>3</sup> Loco citato.

plexus of nerve cells and fibres which seems to preside over the movements of that organ, and to be subjected to both excitation and inhibition through nerve fibres connecting it with the cerebro-spinal centres, it is not improbable that the blood-vessels may be subjected to similar control.

Ostroumoff's observations have shown that this peripheric vaso-motor apparatus, whatever may be its anatomical structure, is able to hold the blood-vessels in a state of tonic contraction after division of the spinal nerves. It was even found that when the blood tension was increased to double its normal amount by irritation of the splanchnic nerves of a dog, one of whose sciatic nerves had been divided, the temperature rose as little in the paralyzed as in the normal limb, showing that the activity of the vascular walls must be independent of influences coming from the cerebro-spinal centres. If, however, the experiment was many times repeated it was found that finally stimulation of the splanchnic nerves caused a great dilatation of the vessels in the paralyzed foot, and but little or none in those of the normal limb. Hence it must be concluded that vessels which are still in connection with the central nervous system are better able to resist the dilating effect of increased blood tension because they are less easily fatigued.

The theory that the spinal nerves contain two anatomically distinct sorts of nerve fibres has been adopted by nearly all recent investigators to explain the fact that stimulation of these nerves may be followed either by vascular constriction or dilatation. Onimus<sup>1</sup> has, however, been led to the conclusion that inhibitory phenomena resulting from the stimulation of a nerve do not necessarily prove the existence of special inhibitory fibres in that nerve. He found, in the first place, that a single moderate irritation of the vagus, instead of arresting the heart, produced a contraction of that organ;<sup>2</sup> also that, when in a curarized animal the heart beats had been reduced to forty or fifty per minute, it was possible, by irritating the vagus or the heart itself with induction shocks at the rate of sixty per minute, to compel the heart to contract synchronously with the electrical stimulation. Analogous observations were made also on the intestines. Here it was found that ordinary tetanic stimulation arrested the peristaltic movements in the neighborhood of the part irritated, causing only a local contraction of the muscles directly between the electrodes, while a series of induction shocks following each other at about the rate of the normal peristaltic contractions (fifteen to eighteen per minute) increased the intensity of these movements.

Onimus therefore concludes that when electrical irritations are ap-

<sup>1</sup> Comptes rendus des Séances de l'Académie des Sciences. November 20, 1876. Tome lxxxiii, page 988.

<sup>2</sup> It is possible, however, as shown by Donders (*Pflüger's Archiv*, i. 331), to produce an inhibitory effect upon the heart by irritating the vagus with a single induction shock.

plied to a nerve at a rate approaching that at which the impulses follow each other along the nerve in its normal condition, the stimulation produces a state of activity in the organs to which the nerve is distributed, but that when the rate of the irritations differs too widely from that of the normal impulses, a condition of inhibition is brought about. In accordance with this theory the production of vascular dilatation by slow rhythmical irritations of a spinal nerve, as observed by Ostroumoff, depends upon an inhibition of vaso-constrictor fibres.

It will be observed that this theory affords no explanation of the fact that while tetanic stimulation of a freshly cut nerve causes vascular constriction, the same stimulation applied to a nerve several days after its division has the opposite effect. Moreover, the vaso-dilator fibres seem in many cases to run in channels anatomically distinct from those of the vaso-constrictor fibres. For instance, the chorda tympani seems to supply exclusively vaso-dilator and the cervical sympathetic vaso-constrictor fibres to the submaxillary gland and the tongue. To cases of this sort the theory of Onimus is hardly applicable. Even in the spinal nerves the courses of the two sorts of fibres seem, according to recent observations of Stricker,<sup>1</sup> to be to a certain extent distinct. The experiments were made on dogs whose spinal cords had been divided a few days before between the dorsal and lumbar regions, by the intervertebral method of Goltz. After the temperature in the hind limbs had fallen to its normal level, the cord was exposed in the lumbar region and the spinal roots subjected to division and stimulation. It was thus found that mechanical as well as electrical stimulation of the peripheric end of the divided *posterior* roots of the fourth and fifth lumbar nerves caused always an elevation of temperature in the foot of the corresponding side. The same stimulation applied to the anterior roots of the same nerves had no constant effects on the temperature of the foot. The author therefore concludes that some, at least, of the vaso-dilator fibres of the foot have a direct course through the posterior roots of the sciatic nerve. Other vaso-motor fibres were found to leave the cord by the upper lumbar and lower dorsal nerve roots. From the fact that two hours after destruction of the whole spinal cord below the fourth dorsal vertebra section of the sciatic nerve caused an elevation of the temperature of the foot, Stricker concludes that vaso-constrictor fibres leave the cord as high as the fourth dorsal nerve, the supposition that the vascular dilatation following section of the nerve might be produced by a mechanical irritation of the vaso-dilator fibres contained therein (according to Goltz's theory) being disproved by the fact that immediately after the section electrical irritation of the peripheric end of the divided nerve was followed by a distinct vascular constriction.

Stricker's experiments have been repeated and his work criticised by

<sup>1</sup> Wiener Sitzungsberichte, July 20, 1876.

Cossy,<sup>1</sup> who points out that, though irritation of the above-mentioned posterior roots may cause vascular dilatation, there is a great difference between the phenomena thus produced and those observed after the irritation of a well-recognized vaso-dilator nerve, such as the chorda tympani or the glosso-pharyngeal, — a difference not only in the constancy and degree, but also in the time of appearance and duration of the resulting dilation. He therefore regards the existence of vaso-dilator fibres in the posterior roots of the lumbar nerves as not demonstrated.

*Collateral Innervation.* — When vascular tonicity is restored in a region which has been separated from its nerve centres, the explanation usually given of the phenomenon is that the terminal apparatus has assumed, in the absence of impulses coming from the central nervous system, a higher degree of activity than it formerly possessed. Stricker<sup>2</sup> has, however, shown that this is not the only method by which such a result may be reached. He concludes from his experiments: first, that each vascular region is supplied by many vaso-constrictor nerves, which leave the cord at different places; secondly, that after division of the cord between the lumbar and dorsal regions the restoration of vascular tonicity in the hind limbs is effected by the vaso-constrictors which leave the dorsal cord above the point of division. He considers it probable that these vaso-constrictors have their centres in the spinal cord (or in the brain), and that they are of themselves too weak to maintain the tonicity of the vessels which they supply, but that after division of the cord they gradually acquire greater power. Stricker proposes the term "collateral innervation" to express this process.

*Antagonism of Vaso-Constrictor and Vaso-Dilator Nerves.* — The effect of simultaneous irritation of the two sorts of vaso-motor fibres has been studied by von Frey<sup>3</sup> by a method similar to that employed by Baxt<sup>4</sup> in the investigation of the inhibitory and accelerator nerves of the heart. The nerves chosen for this purpose were the chorda tympani and the cervical sympathetic of the dog. The effect of the irritation was measured by the amount of blood flowing from the veins of the submaxillary gland, as determined by the automatic recording apparatus described by Gaskell.<sup>5</sup> As the result of his experiments, von Frey concludes that when both nerves are subjected to maximum irritations the blood flows through the gland in the same way as if the sympathetic alone were irritated, and this is the case whether the two nerves are simultaneously or successively irritated. The influence of the chorda tympani, thus held in abeyance, reappears, however, in its full strength on the cessation of the irritation of its antagonist. It may,

<sup>1</sup> Archives de Physiologie, 1876, page 632.

<sup>2</sup> Wiener Sitzungsberichte, February 1, 1877.

<sup>3</sup> Ludwig's Arbeiten, 1876, page 89.

<sup>4</sup> Ludwig's Arbeiten, 1875, page 179.

<sup>5</sup> Ludwig's Arbeiten, 1876, page 45.

therefore, be said that the activity of the chorda tympani produces a certain change in the vascular walls, in consequence of which the flow of blood becomes more rapid, and that the cervical sympathetic, while it cannot hinder this change from running its natural course, can (as long as it is itself active) prevent it from influencing the circulation.

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### THE WEST RIDING REPORT.

VOLUME six of the West Riding Lunatic Asylum Reports is at hand, and, like its predecessors, shows a commendable amount of work on the part of the hospital staff, actual and honorary. In size and style it resembles the last medical report of the Boston City Hospital, and comprises thirteen papers, all quite valuable, and some containing new and original matter. The most important article happens to be the last, On Epilepsies and on the After-Effect of Epilepsies, by Dr. J. Hughlings Jackson. In this paper Dr. Jackson elaborates and reiterates his now somewhat familiar theories on cerebral physiology, much to the reader's advantage. His views, though based on the doctrine of nervous evolution of Herbert Spencer, are supported by his own exceedingly valuable researches into the phenomena of epilepsy. His connection with the Hospital for the Epileptic and Paralyzed gives him an opportunity of observing cases in their incipency, and cases of partial or incomplete epilepsy such as never find their way into hospitals for the insane.

His definition of epilepsy, it will be seen, is far more comprehensive than that of the books. He defines it as an occasional, sudden, excessive, and rapid local discharge of some *part* of the cortex which by some pathological process has become highly unstable. Any set of symptoms presented paroxysmally from such discharge is an epilepsy. Whether consciousness be lost or not is of no consequence. All nervous centres, from highest to lowest, are made up of nothing but nervous arrangements representing impressions and movements. States of consciousness are parallel with certain nervous states of the highest centres, which are its physical substrata, but consciousness is not itself a nervous phenomenon.

Every epilepsy is what Dr. Jackson calls a *brutal* development of the functions of some part of the cortex, and, when the momentum is great, of collateral and lower healthy centres also. Recent experiments have shown that what has been called "menial work" is performed by the cortex. It helps to regulate the beat of the heart, the flow of saliva, the action of vaso-motor nerves, and probably all the organic functions, so that symptoms relating to these functions enter into the phenomena of epilepsy. It is probable that the heart, for instance, is represented in every unit of the very highest centres. In *petit mal* a slight pallor is the only outward sign corresponding to momentary loss of consciousness. Here the highest centres, anatomically speaking, are alone involved. When the fit begins lower down consciousness is often preserved.

The symptoms of a fit may be motor or sensory. The convulsion is obvious, but the sensory derangement being subjective the evidence is indirect.

Colored vision, numbness, sensations of cold, nausea, and suffocation, vertigo, noises and voices in the ears, are sometimes reported by the patient at the onset of the fit. Dr. Jackson considers migraine a slow epilepsy in which colored vision occurs, with sometimes a zigzag outline indicating excitation of some closely allied motor centre. The headache and nausea are sequelæ of the discharge. The auditory auræ are probably sometimes sensori-motor.

There is loss of function in two ways during epilepsy: First, during the discharge the ordinary use of the centre is in abeyance. No elaborate actions or mental states occur. The so-called intellectual auræ, such as spectral illusions and voices, are due probably to the activity of healthy parts secondarily excited. The second kind of lost function is due to exhaustion from excessive nervous discharge. This was Todd and Robertson's hypothesis, but Dr. Jackson gives it new proof and illustration. For instance, after a convulsion beginning unilaterally there is often hemiplegia of the side first convulsed. There is a transient epileptic aphasia, from the same cause apparently. Post-epileptic loss of consciousness he attributes to exhaustion of the highest centres, during the discharge of which consciousness ceases, we know not why nor how. In the simplest forms of incomplete epilepsy, also, there may be local paralysis, or at least numbness, which is a phenomenon similar to the excessive fatigue following excessive muscular action of a healthy kind.

In the principle of compensation Dr. Jackson finds an explanation of the fact that movements may be largely represented in parts the destruction of which shows no loss of movement. According to his hypothesis each movement is represented everywhere, but particular movements are specially represented in certain parts. The centres or areas of Hitzig and Ferrier are not abrupt localizations, but places where certain movements are specially represented. Extirpation produces transient palsy, while slow destruction, as by a tumor, allows of gradual compensation, which proceeds *pari passu*.

The transient paralysis following epilepsy may vary in range and degree. In the third volume of these reports Dr. Jackson compared three degrees of convulsions beginning unilaterally with three degrees of hemiplegia from clot in the corpus striatum. He believes there are degrees of dissolution corresponding to the steps of evolution. In the first degree of hemiplegia, for instance, the eye and head movements escape, not because they are not represented in the destroyed units of the corpus striatum, but because they are also represented in every unit of the parts intact. In the second degree the eye and head movements suffer because from the graver lesion too few units are left.

It is impossible to follow here in detail the further elaboration of the above theory of representation. Dr. Jackson does not, as some have supposed, regard the ordinary attacks of epilepsy beginning with loss of consciousness as originating in the middle centres, known as Hitzig and Ferrier's region, but in those highest centres situated anteriorly and posteriorly. He believes that the left posterior and right anterior parts of the cortex are the substrata of subject-consciousness, — that is to say, they represent the whole organism as it is *affected* by its environment; while the right posterior and left anterior parts are the substrata of object-consciousness, and represent the whole organism as

it reacts on the environment. For the explanation and what little proof is afforded by the phenomena of epilepsy of this hypothesis the reader must be referred to the paper itself.

The next longest and most important paper is by Dr. Browne, On the Pathology of General Paralysis. He recounts the characteristic gross appearances familiar to all asylum physicians, and selects adhesions of the pia mater to the subjacent gray matter as the most constant lesion. He believes that these adhesions explain the essential nature of the morbid process, which he considers to be a chronic inflammation growing out of abusive functional activity. He thinks that when carefully studied they will account for the order of the symptoms. As is well known, these adhesions affect chiefly the anterior portion of the cortex and the summits of the convolutions. The latter fact he accounts for by the mechanical contact of these summits with the unyielding cranium. Dr. Brown emphasizes the fact that in all chronic forms of insanity the visible pathological changes terminate at the parieto-occipital gyri. Thickening of the arachnoid, adhesions of the pia mater, wasting of the convolutions, and even microscopic changes are rare in the occipital lobes. This statement rather destroys the force of his attempt to connect the adhesions in general paralysis with corresponding motor symptoms. To be sure he does this only in the most general way, but affirms that the adhesions, when carefully studied, will show such correspondence.

The paper is illustrated by plates showing the adhesions in six cases of general paralysis. The ordinary method of stripping the pia mater with forceps under water is very tedious and liable to tear the gray matter of the cortex. Having learned of Professor Rollston, of Oxford, a method of hardening the brain in nitric acid, Dr. Brown found that he was enabled to remove the pia mater completely and easily, leaving a beautifully distinct map of the erosions, which could be drawn and colored effectively.

There is a paper instructive to physiologists and physicians which we have space only to mention, by Dr. W. Bevan Lewis, presenting a series of Calorimetric Observations upon the Influence of Various Alkaloids on the Generation of Animal Heat. The list includes atropine, solanine, hyoscyamine, strychnine, picrotoxine, ergotine, and chloral.

Dr. Lawson has continued his observations on the effect of hyoscyamine in the treatment of insanity. He finds it of value in cases where aggressive and destructive excitement is the leading symptom. Its value in these cases depends on the extreme physical helplessness induced, the memory of which serves afterward to stimulate the patient's self-control. This treatment has a disciplinary aspect and savors of chemical restraint, but if it does good it is not worth while to give it a bad name.

There is a useful paper on the Therapeutics of some Affections of the Nervous System, by Dr. Fothergill; one on Classification and Nomenclature in Nervous Disorders, by Dr. Rabagliati; and a more practical one on the Climacteric Period in Relation to Insanity, by Dr. Merson. Dr. Clapham continues his statistics on the Weight of the Brain in the Insane, and jointly with Dr. Clarke gives measurements of the Cranial Outline of the Insane and Criminal, taken by means of the "conformateur" used by hatters.

T. W. F.

SEGUIN ON SPINAL PARALYSIS.<sup>1</sup>

THE present work is an enlargement of an essay read in 1874 before the New York Academy of Medicine. It contains accounts of forty-five cases, of which seven are contributed by the author, all referring to adults; the affection in children, being already quite well known under the designation of "essential" or "infantile" paralysis, is not specially described. The identity of these two affections is shown by the author, and their leading symptom, a wasting of the voluntary muscles, is referred to a lesion of the motor cells in the anterior cornua. Other lesions of the cord often coexist, as sclerosis or softening. Clinically, the disease is divisible into an acute, a subacute, and a chronic form. Its diagnostic points are rapid paralysis with loss or perversion of electric reaction (unlike progressive muscular atrophy); wasting of the muscle (doubtless due to the spinal lesion, as in progressive atrophy); subordinate importance of symptoms relating to sensibility; absence of tendency to the occurrence of complete and lasting paralysis of bladder and rectum. The chapter on diagnosis contains a valuable suggestion as to the possible identity of cases of limited, so-called "rheumatic" paralysis, and some cases of atrophy after neuralgia, with the present affection.

A very careful analysis of the symptoms is given, with a synopsis of the pathological anatomy of the cases hitherto examined, both in adults and children. Treatment is fully entered upon, and the actual cautery, ergot, iodide of potassium, belladonna, electricity, baths, and massage are recommended. The memoir, while valuable as a whole, is especially full in its clinical accounts and its descriptions of symptoms.

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HOSPITAL REPORTS.

IN our comments upon the published transactions of medical societies, we have not hesitated to complain of what we have always considered a great waste of valuable material which was thus withheld from circulation in periodical literature and buried between the covers of an annual report. It might be supposed that the same argument would hold good when applied to hospital reports, but a glance is sufficient to convince one that the vast resources of such an institution as a great hospital could not be made to serve the purposes of instruction more effectually than when the results of the labors of its professional staff are collected and arranged in a manner which greatly strengthens the value of each component part, and presents in a condensed form, but on a large scale, the practical applications of the latest advances in the science and practice of medicine.

It is therefore an agreeable task for us to welcome the second series of the Reports of the Boston City Hospital, which has been one of the first in this country to attempt a fair representation of hospital practice, and which affords an ample confirmation of our views. We can read, for instance, in the description of Dr. Cowles, an account of that new departure in hospital construc-

<sup>1</sup> *Myelitis of the Anterior Horns, or Spinal Paralysis of the Adult and Child.* By E. C. SEGUIN, M. D. New York: G. P. Putnam's Sons. 1877. 8vo. Pp. 120.

tion, the pavilion system, as well as the various details of a finely equipped modern hospital. Illustrated by copious diagrams, it forms a valuable contribution to a question at the present time of primary interest and importance.

The department of medicine is appropriately represented by an article from Dr. John G. Blake, on the Treatment of Empyema by Permanent Openings, a subject which owes its prominence chiefly to the labors of Boston physicians, and the literature of which Dr. Blake has enriched by a collection of nineteen cases, which are, we may add, to our minds prepared in a clear and instructive manner. The cold-water treatment in typhoid fever is a question which must be solved by hospital practice. Dr. Edes gives a report of thirty-five cases treated systematically in this way from the first week of the disease with but one death. The great difficulty of carrying out this treatment is, however, frankly acknowledged. Dr. Green's warning in regard to the dangers of disease of the brain arising from inflammations of the ear is another practical point of interest to every practitioner. These are but samples of a valuable collection which includes reports on several special subjects.

The chief labor of the surgical part of the report is borne by Dr. Cheever. It consists mainly of an abstract of the surgery of the period embraced, with also a collection of rare cases occurring in his own service. We have already alluded to the specimen of an elbow-joint resected by the subperiosteal method, showing the reproduction of bone, a specimen which might fairly be said to rival that of Professor Woods shown at the late German surgical congress. A valuable contribution on compound fractures is given by Dr. George W. Gay. The field for such work is broad in this country, but one hitherto sparingly utilized. We should all be glad to see the vast clinical resources of New York made available in this way, and to profit by the experience of Southern and Western hospitals.

We must express the hope that the excellent example set by the City Hospital staff will find speedy imitation elsewhere.

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#### HYDROPHOBIA: A REPLY TO DR. YOUNG.

MESSRS. EDITORS, — In the JOURNAL of June 14th, Dr. Aaron Young "ventilates" his views on hydrophobia. Will you kindly allow me to make a few remarks upon the same?

The gentleman says he gathers "from observation and the remarks of the vulgar and intelligent, in countries where dogs are treated humanely, on the principle of live and let live, *both* sexes are equally spared, and are 'as thick as frogs in Egypt.'

"During a residence of eleven years in Brazil I never heard of a case of hydrophobia, and pressing inquiries elicited what was regarded as a true solution of rabies in the dog. *It was our inhumanity to the animal.* Domesticated and domiciled as a true friend, we are regardless of his natural instinct. We destroy the female to an extent which causes an unnatural disparity of the race. In Brazil the *mare* is never ridden; it is considered *vulgar*," etc.

Now Dr. Young must be a believer in the "spontaneous generation" the-

ory of rabies, — a theory that is considered untenable by the "masters" of the profession, such as Virchow, Bollinger, Neimeyer, Von Reder, Billroth, Schmidt, etc. Bollinger says of the disease: —

"It is an acute, infectious disease, coming on in the form of a functional disturbance of the central nervous system, with an absence of all gross anatomical changes, and distinguished from other similar diseases by its long and extremely variable period of incubation. The specific materies morbi, the intimate nature of which is unknown, belongs to the endogenous class of specific poisons, is propagated only in infected animal organisms, is fixed, non-transportable (*nicht verschleppbar*), and never volatile. As in the case of genuine inoculable diseases, hydrophobia originates only through infection, it being essential that the virus should come in contact with an abraded portion of the skin of mucous membrane, in which respect it bears the closest resemblance to syphilis. The communication of the poison is effected almost invariably by means of the bite of a rabid or infected animal, whereby the poison is implanted directly in the animal. The existence of a spontaneous or so-called miasmatic development of hydrophobia is entirely unproved."

The fact of the occurrence of rabies in wild animals (wolf, fox, skunk), among which the numerical relation of males to females is a natural one, no obstacle being opposed to the gratification of the sexual appetite, affords proof of the fallacy of Dr. Young's hypothesis, as also does the circumstance that the disease does not prevail in all places and continuously, but appears at certain times only, and then is confined to a certain territorial district. Hydrophobia has *never* been known to arise among wild beasts kept in close confinement in menageries and zoölogical gardens, to whom the gratification of the sexual appetite is for a long period of years denied.

For upwards of a century no canines of the "troublesome" sex have been permitted in the Island of Sark, in the English Channel, and yet, with a large dog population, a case of hydrophobia has never been known. In Greenland, where "both sexes are equally spared," hydrophobia raged in 1860, and again in 1863. Constantinople, justly called a "canine paradise," has dogs "as thick as frogs in Egypt," the numerical relation of the sexes being regulated entirely by nature, yet hydrophobia is of frequent occurrence; hundreds and thousands of animals died of rabies in 1839. The same may be said of Athens, where so many victims died of rabies in 1866.

Algeria, Egypt, the East Indies, China, Cochin China, Java, Palestine, British Guiana, West Indies, and the Argentine Republic have all suffered more or less, the very countries where rabies should *not* appear, according to Dr. Young.

"Eleven years' residence in Brazil" proves nothing. Hundreds of physicians have practiced medicine in New England alone for half a century, and never met with a case of rabies, and never would have heard of one but through the medium of the press. Hydrophobia appeared as an epizootic in Bahia, San Salvador, Brazil, in 1821, and the year following in certain districts of the province of Rio Grande do Sul. In October, 1867, a mulatto was bitten by a dog in the Rua dos Latociros in the city of Rio de Janeiro, or, properly, San Sebastian. The dog was killed, and the mulatto died in the

Jurujuba Hospital. Dr. Correo de Azevedo, then attending physician, but now resident of Theresopolis, is the authority for this statement.

Again, though a year's residence in Newfoundland may have qualified the doctor, he is nevertheless in error regarding the appearance of hydrophobia, as several cases occurred among the dogs of that island in 1865.

"Cauterization is a humbug!" Strong words. When his young son was bitten by a rabid dog, Dr. Yarrow (U. S. A.) cauterized the boy's wounds with fuming nitric acid, after using the scalpel freely; this a couple of hours or more after the youth was bitten, though the hospital steward had previously used lunar caustic. Although the bites inflicted by the animal just previous and subsequent to his attack upon young Yarrow proved fatal, the boy escaped. Think you Dr. Yarrow considers cauterization a humbug? It seems to be the only thing thus far that offers a chance for safety.

G. ARCHIE STOCKWELL.

NEW YORK, June 19, 1877.

COMPARATIVE MORTALITY-RATES FOR THE WEEK ENDING JULY 14, 1877.

|              | Estimated Population,<br>July 1, 1877. | Total Mortality<br>for the Week. | Annual Death-Rate<br>per 1000 for the Week. | Death-Rate for the<br>Year 1876. |
|--------------|----------------------------------------|----------------------------------|---------------------------------------------|----------------------------------|
| New York     | 1,077,228                              | 831                              | 40.11                                       | 27.46                            |
| Philadelphia | 850,856                                | 441                              | 26.95                                       | 22.88                            |
| Brooklyn     | 527,830                                | 347                              | 34.18                                       | 24.31                            |
| Chicago      | 420,000                                |                                  |                                             | 20.41                            |
| Boston       | 363,940                                | 147                              | 21.00                                       | 23.39                            |
| Providence   | 103,000                                | 34                               | 17.16                                       | 18.34                            |
| Worcester    | 52,977                                 | 21                               | 20.61                                       | 22.00                            |
| Lowell       | 53,678                                 | 16                               | 15.50                                       | 22.21                            |
| Cambridge    | 51,572                                 | 21                               | 21.17                                       | 20.54                            |
| Fall River   | 50,372                                 | 26                               | 26.84                                       | 22.04                            |
| Lawrence     | 37,626                                 | 18                               | 24.85                                       | 23.32                            |
| Lynn         | 34,524                                 | 8                                | 12.05                                       | 21.37                            |
| Springfield  | 32,976                                 | 10                               | 15.77                                       | 19.69                            |
| Salem        | 26,739                                 | 6                                | 11.67                                       | 23.57                            |

MESSENGERS. EDITORS. — Can you not call the attention of the profession to the propriety of agreeing upon a uniform way of pronouncing the word "gynæcology?" Let it be *g* hard or *g* soft, and *y* long or *y* short, but let us have uniformity.

Again, let me ask why we say "dia'meter," and on the other hand "kilome'ter." It has always been "penta'meter," "hexa'meter," and why not "deka'meter" and "hecto'meter"? UNIFORMITY.

BOOKS AND PAMPHLETS RECEIVED. — Syphilitic Phthisis. A Paper read before the Missouri State Medical Association. By William Porter, M. D. St. Louis. (Reprint from Transactions.)

The Annual Announcement of the Department of Medicine and Surgery of the University of Michigan for 1877-78.

Sixth Annual Report of the Trustees of the City Hospital of the City of Worcester.